Section of Anæsthetics.

President—Dr. H. J. Shirley, C.M.G.

Anæsthetics in the Plastic Surgery of the Face and Jaws.[1]

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The cases upon which this paper is based are all war injuries and represent about 3,000 anæsthetics administered by us at the Queen's Hospital, Sidcup. With the exception of an occasional excursion to the ribs and limbs for pieces of cartilage, bone, or skin for grafts, the operative work is entirely confined to the facial and jaw regions. The cases are practically all clean ones, and the importance of the anæsthetist's manipulations not transgressing the rigidly aseptic technique which all plastic work demands will be apparent. He must put his patient under, fix in his airways and tubes, and then get out of the way until the operation is over.

Type of Patient.

The patients are men of military age, most of them "war-time" soldiers, recruited at a period when the demand for men eclipsed to some extent the physical standard. The shock of severe wounds and repeated operations has in many cases considerably reduced their stamina and some of them do not stand operation at all well.

On the whole there are few chest complaints, but a considerable number show some degree of cardiac dilatation and irregularity. This latter may possibly be due to excessive cigarette smoking, as may also the abnormal irritability of their nasal and laryngeal mucous membranes to ether vapour. The men have nearly all had many operations; the average case which comes into the theatre now is about to have his ninth or tenth anæsthetic and one often meets men who have had twenty-five or even thirty. Most have been severely wounded, but with the exception of those who have been much burnt, and who stand operation badly, and of those in whom the function of mastication is lost and whose nutrition is therefore poor, the long and repeated operations are borne remarkably well.

The mental condition of the patients is interesting; of the operation itself they have no fear and are even careless after many, but with regard to the anæsthetic there is always a certain amount of distasteful apprehension. In the case of officers this apprehension is considerably more marked; flying officers who have had a crash seem to be particularly nervous, some of them going through their fall again whilst going under.

Preparation of the Patient.

This does not differ from ordinary hospital routine. A notice advising patients to refrain from excesses of any kind for three days before operation is posted in the wards, but receives doubtful attention.

[1] At a meeting of the Section, held February 4, 1921.

Preliminary Injection.

Atropine, $\frac{1}{50}$ gr., is administered in all cases. We find that smaller doses are insufficient to control the flow of mucus. As regards morphia—one of us administers $\frac{1}{6}$ gr. unless specially contra-indicated, whilst the other gives $\frac{1}{4}$ gr. in only those cases in which gas and oxygen are to be given.

Induction.

The patients are extremely intolerant of anæsthetics, especially ether; so much so that a little ether accidentally spilled in a ward is quite sufficient to put most of the inmates off their dinner. Many men begin retching immediately they enter the anæsthetic room. We have used tincture of lavender and tincture of bitter orange to mask the smell, putting a little about the room and on the mask, and have frequently found it very effective.

Like all soldiers, our patients are resistant to the action of the anæsthetic drug. It is no uncommon thing to use 6 oz. of ether and to take ten or twelve minutes to get a patient properly under.

Our chief difficulty, however, is always that of maintaining a proper airway. Loss of part of the mandible, scarring and adhesions around the tongue, microstoma, trismus, and splints or other apparatus fixed in the mouth are the chief obstacles to be circumvented.

With ether and mixtures our general practice is to hold up the base of the tongue with a long blunt instrument such as a pair of sponge-holding forceps passed through the mouth immediately any signs of diminished airway appear. Traction on the tongue and advancement of the jaw, when present, are usually of no avail in cases with lower jaw injuries. Nasal tubes are sometimes useful, but do not always give a sufficient airway. In this connexion Dr. Rood's method of induction with ether by gradually drawing a towel over the head and including the mask and anæsthetist's hand is particularly useful, since it allows full control of the airway without interruption of the steady increase of ether concentration. The preference shown by these men, who so detest ether, for an induction at any rate started with gas and oxygen is natural, but it is only lately that we have arrived at a technique which enables us to use it in the case of patients with broken or abnormal jaws. Our procedure is as follows:—

A large size London Hospital or funnel airway is chosen and a 5-in. length of rubber tubing which will just pass through it is pointed and eyeletted at one end. By stretching successive portions along one aspect of the tube a curve may be imparted to it. The airway is inserted between the patient's teeth and a gas mask with an extra large air cushion, such as Marshall's, applied. An air-tight fit is usually easy to obtain. If this is not possible, the valves are set to "to and fro" and sufficient gas and oxygen run into the bag to keep it gently blowing out around the mask. As soon as the patient's airway begins to diminish the mask is quickly removed and the rubber tube, previously greased, is rapidly passed through the funnel airway with its point at first directed towards the palate. It thus runs along the roof of the mouth and its getting caught under the tongue is avoided. When it has entered about 2 in., it is given a half-turn, and pushed home for its entire length. A good airway always results and the tube is passed so quickly that the patient does not have time to recover.

It is worth noting that we have had only one case with a permanent tracheotomy and in no other has a tracheotomy been found necessary to ensure safe anæsthetization.

Few patients show signs of much nervousness, but as an attempt to obtain a happier induction and to abolish struggling we have of late made use of a certain amount of suggestion.

Maintenance of Anæsthesia.

The methods of maintaining anæsthesia vary according to the requirements of the surgeon and the site of the operation. Roughly speaking, when the site is above a horizontal line drawn through the upper lip the anæsthetist is given control of the mouth for his administration, and the mouth is excluded by towels from the aseptic field. When the site is below this line he is given control of the nose, which is excluded as before.

The following scheme indicates roughly the range of operations performed. It is subdivided into groups upon which the route of administration is dependent:—

General Classifications of Operations.

Group I.—Mouth available.

(A) *Eye.*—(1) Reconstruction of eyelids: forehead flaps, &c.
(2) Skin grafts to outer aspect of lids for cure of traumatic ectropion.
(3) Skin grafts to the eye-socket for correction of distortion.

(B) *Nose.*—(1) Simple plastic procedures.
(2) Preliminary rhinoplastic operations: establishment of air-way, &c.
(3) Complete rhinoplasty.
(4) Cartilage grafts from ribs to nose, requiring relaxation.

(C) *Intra-nasal.*—Some for cure of conditions due to wounds; most for ordinary civil nose and throat complaints.

Group II.—Nose available.

(A) *Intra-oral.*—(1) Skin grafts to restore sulci, &c.
(2) Various plastic operations inside the mouth, including a few cleft palate operations.

(B) *Bone-grafts.*—Iliac crest to mandible.

Group III.—Mouth or Nose available according to site.

General plastic operations to face and lips:—
(1) Simple excision of scars.
(2) Large flap replacement, e.g., double pedicle forehead flaps for repair of chin region.
(3) Fat grafts from the abdominal wall.
(4) Formation and transplantation of tubed pedicles.

Group I.—The Anæsthetic is administered by the Mouth.

This is the route used in all except intra-oral and lip operations.

(A) The simplest method, and in short cases with normal jaws, the easiest, is the use of a Hewitt's or Phillip's airway with Dr. Shipway's three-bottle warm ether apparatus. The great drawback of this method is the necessity for supporting the chin. The anæsthetist's hand must lie under the towels and any movement on his part is liable to disarrange them. This is avoided by the use of a long wide rubber tube passed well beyond the base of the tongue, or better still by intubation with a Kühn's tube.

(B) An improvement on this method consists in the use of an angle-piece attached to the airway or long pharyngeal tube, and connected by a short length of wide-bore rubber tubing to a funnel, the mouth of which is covered

with flannel or gauze on which the anæsthetic is dropped. The mouth and nose are packed so that respiration takes place entirely through the tube.

The method has the following advantages: (1) Simplicity; (2) the mouth can be closely covered up; (3) the patient's expirations are entirely diverted from the surgeon; (4) the respiratory sounds are magnified at the mouth of the funnel.

The disadvantages of the method are: (1) The use of the apparatus involves the "draw-over" principle. A wide bore tube and the absence of valves, however, actually cause little resistance. We have employed this method many times without untoward results in short operations. (2) The anæsthetic vapour is not warmed. This difficulty can be partially overcome by supplying warm ether vapour from a Shipway's three-bottle apparatus into the funnel.

An example of an attempt to develop this simple apparatus and overcome its disadvantages is exhibited. The tube and funnel attachment of Kühn's tube offers, in our opinion, too much respiratory resistance and is therefore not used.

(C) The same arrangement of Phillip's airway or pharyngeal tube with angle-piece and wide tubing can be attached to a Bath three-way stopcock and gas bag, after removal of the face-piece, and nitrous oxide, oxygen and ether administered with rebreathing. In one or two cases we have passed a stout rubber tube through the glottis by direct vision and connected it with the wide tube and gas bag with satisfactory results.

(D) *Endopharyngeal insufflations* of ether, delivered from an intratracheal apparatus, or of gas-oxygen-ether are both very easy and require no comment beyond the fact that we find it advisable to use a tube of at least 1 cm. calibre and to hold it in place by adhesive plaster. The method is very wasteful of gas.

(E) *Intratracheal insufflation.*—For by far the greater proportion of cases intratracheal insufflation is our method of choice. Its safety and freedom from airway troubles, no matter how much the surgeon may move the patient's head, or in however awkward a position he be, make it invaluable in plastic work.

We have found that in many cases there is some resistance to expiration. A tube, passed down by the side of the catheter almost as far as the glottis, obviates this and allows proper collapse of the chest, thus aiding circulation and avoiding unnecessary strain on the heart. When ether is being given it is a distinct advantage to the surgeon if an angle-piece be attached to this tube and the ether-laden expirations be thus carried a few inches to the side, so that he does not get them full in the face.

The method of intratracheal administration of ether is well known and requires no comment, but intratracheal insufflation of gas-oxygen-ether has given such good results in these long cases that a few remarks concerning it are not out of place. Manifestly, gas with sufficient oxygen for the patient's needs will not keep him properly anæsthetized. A certain amount of ether must therefore be added and, as with intratracheal insufflation there can be no rebreathing into a bag, a definite, small, but perfectly controllable amount of ether vapour must be continuously added to the mixture, This we achieve by means of the bottle to be shown later.

In connexion with the introduction of the catheter in these cases the following points may be emphasized:—

(1) The relaxation of a really deep anæsthesia makes it much easier to view the cords, especially in much scarred cases. With cocainization and light anæsthesia we find much more difficulty.

(2) To circumvent such obstacles as degrees of trismus, microstoma, and the receding jaw often resulting from bone grafts in the symphyseal region, the use of a small sized laryngoscope is often necessary. Lubrication of the laryngoscope with vaseline helps considerably.

(3) We find it easier to keep the patient's head in a perfectly natural position, neither flexed nor extended; but in cases with much loss of the mandible it is sometimes better if the head be slightly flexed. In these cases the whole larynx has dropped and the distance from the teeth to the cords is greater.

GROUP II.—THE ANÆSTHETIC IS ADMINISTERED BY THE NOSE.

This channel is used in operations upon the mouth and lips. The mouth or pharynx is usually packed with gauze to prevent blood from trickling back or bubbling up and obscuring the surgeon's view.

(A) A nasal airway is obtained by passing a rubber tube through one side of the nose and well beyond the base of the tongue. A tube leading from a Shipway's three-bottle apparatus is now hooked into the end of this nasal airway and held in position by adhesive plaster. This is an unsatisfactory method, a sufficiently free airway for proper to-and-fro breathing being very rarely obtained. Nasal tubes should be shaped to a point and smeared with vaseline to facilitate their passage. It is as well to have at hand one or two sizes varying from about 22 to 32 French catheter gauge. Starting with the smallest they can be passed one after the other, thus gradually dilating the nasal passage and enabling the largest to lie without kinks or constrictions.

(B) The nasal tube may be connected by an angle-piece to a larger tube, which by its other end is attached to a funnel, our funnel apparatus, or a gas bag, in the same way as described for administration by the mouth. In giving gas it is often useful to keep the bag slightly distended so that inspiration is performed with less effort.

At one time we used two nasal tubes connected with the larger tube by a "Y" piece, but the frequent occurrence of the condition of deflected septum and also the fact that the tubes were liable to compress each other forced us to the conclusion that one large tube, passed after gradual dilatation of the nasal passage, gives by far the best airway.

(C) *Endopharyngeal Insufflation* of ether or gas-oxygen-ether proves very useful in cases of trismus, where the mouth cannot be opened sufficiently to admit a laryngoscope, and in cases in which the jaws are splinted up for bone grafts. A medium sized nasal tube, connected with the anæsthetic supply is passed into the pharynx through one naris and, if the operation is likely to cause bleeding into the mouth, a larger sized tube is passed through the opposite side of the nose to provide a return airway and the back of the mouth packed with gauze. Ether vapour or gas supplied to the patient in this way should have a safety valve in its course as in intratracheal insufflation, as any obstruction to the return airway would mean a great increase of pressure in the patient's air passages.

(D) *Intratracheal insufflation by the nasal route* is even more useful than by the oral route. It gives the anæsthetist that happy confidence in freedom of airway and the impossibility of blood getting into the trachea just in those cases where he most needs it. For all intra-oral operations it is combined with a return nasal airway through the other side of the nose. Where the pharynx cannot be conveniently packed the intermittent use of a suction apparatus attached to this return airway is of great advantage in keeping a clear field for the surgeon.

Passing the catheter is not difficult. It consists essentially of three stages: (1) Passing the catheter through the nose and nasopharynx; (2) catching it up in the pharynx by means of a special guiding rod or forceps: (3) directing it into the trachea. The guiding rod is a round rod of metal $10\frac{1}{2}$ in. long. The end for picking up the catheter is sloped away on its under side in order to allow it to dip more easily from the laryngoscope into the eye of the catheter and the terminal quarter-inch is slightly tilted upwards. This tilt gives an upward bend to the catheter which makes its introduction through the cords much easier. When an "aseptic" catheter is used, before it is introduced, the end of the guiding rod is pushed from the top of the eye into the solid end and a little notch made for its reception in stage (2). This is unnecessary when the old type of catheter with hollow end is being used.

Magill's forceps are constructed with a bend to clear the field of vision as in Heath's nasal forceps, the ends which grasp the catheter representing a cylinder split longitudinally and serrated on its inner surface. With their use there is no injury to the end of the catheter and, once grasped, the hold is secure without the necessity of holding on to the free end which protrudes from the nose. The forceps may be used inside as well as at the side of the speculum; with the latter method the field of vision remains clear.

Details of Method.

Stage I.—The passage of the catheter through the nose is usually easy. Stiff, new catheters sometimes strike the back of the nasopharynx and refuse to go on. Rotation of the catheter or the previous passage along its lumen of a piece of stout wire, followed by bending so that there is a very distinct tilt to the end of the catheter will usually overcome this difficulty. The wire should, of course, be removed before proceeding to the next stage.

Stage II.—A view of the catheter is obtained by means of a laryngoscope passed through the mouth. If the guiding rod be used, it is passed down the speculum and its extremity pushed into the notch in the end of the catheter, the outer end being held meanwhile, between the little and ring fingers of the hand manipulating the rod. After it has been picked up it is essential that the catheter be held taut outside the nose so that the guiding rod shall remain pushed home in its end. With the forceps all that is necessary is to seize the catheter near its end.

Stage III.—The laryngoscope is now manipulated so that a view of the glottis is obtained; the end of the catheter is directed between the cords and then pushed on from its nasal end.

In the case of an ordinary adult the catheter should be passed for a distance of about 30 cm. from the ala of the nose, or about 5 cm. farther than the distance from the teeth required in the oral route.

In a few cases it is not necessary to guide the catheter at all; it happens to have the correct curve to carry it through the glottis when it is simply pushed on from the nasal end. This is especially likely to happen when the epiglottis has been raised by the laryngoscope. Definite attempts to judge this curve and so simplify the procedure have not, however, met with much success; moreover, one cannot always ensure that the catheter will lie in the mid-line.

To prevent kinking of the catheter in its course round the ala nasi, it is a good thing to cut off the outer end and fit on a small metal angle-piece.

The return airway is obtained by the passage through the opposite naris of a piece of large sized rubber tubing (30 or 32 French catheter gauge, walls

2 mm. thick), after gradual dilatation, as already described, for obtaining a nasal airway. The length of tubing required may be roughly estimated by the distance between the ala nasi and the external auditory meatus of the same side; but the most suitable length can really only be found by trial in each case, a good return airway with the end of the tube as near the glottis as possible being the aim. A metal angle-piece may be fitted into the outer end of the tube to direct the anæsthetic vapour away from the surgeon and to prevent towels obstructing the airway. The back of the mouth is now packed with a long strip of gauze.

GROUP III.

One or other of the foregoing methods is used according to the chief site of operation.

NITROUS OXIDE ANALGESIA.

Where a patient has to undergo so many operations it is obvious that some alternative to repeated general anæsthesia is desirable.

In operations involving the transposition of flaps the importance of maintaining the vitality of the part is considered by some to render the injection of local anæsthetics inadvisable. For the excision of small scars, however, local infiltration with novocaine and adrenalin proves satisfactory. For more extensive operations we found that local infiltration was insufficient and therefore combined it with an injection of morphia and scopolamine. Even this union left something to be desired in many cases—the patients felt no pain but were often much distressed. We now add to this nitrous oxide analgesia and find the combination gives by far the best results. The patients are cheerful though sleepy; and feel no pain or discomfort, though quite large operations are performed on their faces.

Morphia $\frac{1}{4}$ gr. and scopolamine $\frac{1}{100}$ gr. is administered three quarters of an hour before operation. Arrangements are made for the supply of gas by means of a bent metal tube in the mouth or a short rubber one in the nose. If convenient to the surgeon a nasal cap may be used.

Where the anæsthetist has complete control of the mouth, a rubber mouth-piece, such as was used on the military anti-gas mask, is more comfortable for the patient to hold. We have used this mouth-piece connected with a gas bag, the lips being covered by a piece of rubber sheeting, and in this way have been able readily to vary the degree of analgesia. Where necessary the patient can even be rendered unconscious for a short time. This is particularly useful in the cutting of skin grafts without novocaine infiltration, the removal of extensive nasal polypi and curetting of the ethmoid cells. It is also useful in the operative treatment of squint as one can prevent the patient from feeling any pain and, by withholding gas, allow him to move his eyes when asked to do so by the surgeon.

In all ordinary cases the patient is instructed to take sufficient gas to produce a feeling of "woodenness." Thereafter he regulates the amount of gas inspired so as to keep himself in that condition in which he is still conscious and able to answer questions, though aware of the manipulations of the surgeon, and yet feeling no actual pain.

The operation area is infiltrated with 1 per cent. novocaine and adrenalin 1 in 1,000, three drops to the ounce.

Intelligent co-operation and self-control are essential and the method is not so useful in nervous or emotional patients.

Condition of Patient during Operation.

Although the operations are long (their average duration in our last 500 cases was one hour and forty minutes, and three hours is often exceeded) the condition of the patients is, on the whole, surprisingly good. Shock and collapse are not often seen; when they do occur it is generally in large flap operations, necessarily accompanied by a considerable amount of hæmorrhage, as for example when a double pedicled flap from scalp to forehead is brought down over the face for the reconstruction of the chin region.

When signs of collapse do appear it is generally sufficient to tip the table slightly, but in cases in which much blood has been lost we make a rule of giving saline by the rectum. In large flap operations the patient is often placed in a half-sitting position by the surgeon in order to diminish hæmorrhage: although this certainly does lessen the amount of bleeding, it undoubtedly appears conducive to collapse, and we usually request the surgeon to lower the patient as soon as the flap has been cut and the bleeding points secured.

Recovery.

In very many of our cases the injuries about the mouth are such as to render the maintenance of the airway somewhat difficult after return to the wards. It is sometimes sufficient to leave the catheter in the trachea until the patient begins to cough it out; in other cases a long piece of tubing passed down beyond the base of the tongue attains the same object. In this respect the superiority of gas-oxygen-ether over ether alone is evident on account of the very rapid return of reflexes.

It is important that the pharynx be cleared of mucus or blood by careful swabbing before the patient leaves the theatre.

Post-anæsthetic vomiting with gas-oxygen-ether is negligible in amount. The patient usually vomits once, a few minutes after the administration is stopped, and before he is conscious, and then no more. With ether, vomiting usually returns two or three times during the twelve hours after operation. Careful cleansing of the pharynx and mouth of all ether-laden mucus and blood, attained in intratracheal cases by free irrigation with saline, we are certain does much to prevent this post-anæsthetic vomiting.

Chest complaints are rare. Out of 1,700 cases during the last twelve months we have had four cases of bronchitis and two of pneumonia. This may be due to the fact that our ether or gas is always warmed, and that as the operations are not of an urgent nature, they may be postponed if the patient complains of cough or cold.

Conclusions: Choice of Anæsthetic.

It early became apparent that as the same patients were coming up for operations again and again, it would be a distinct advantage if records of all anæsthetics were kept: a form for this purpose was printed and used.

Of general anæsthetics, the choice lies between ether and gas-oxygen-ether. Chloroform is practically never given. The patients usually do well on ether, but their general condition both during and after operation is decidedly better when gas-oxygen-ether is used. The early return too, of the reflexes and the almost entire absence of vomiting, make it highly preferable for these cases. When the surgical condition permits, it is not uncommon to find patients up and about on the day after a long gas anæsthetic administration.

In a few cases in which there were signs of bronchitis, a mixture con-

sisting of one part chloroform diluted with nine parts of spirit. vini rect., was used with the gas mixture. The course of the anæsthesia went smoothly, and the patient suffered no ill-effects nor was the bronchitis increased.

Rectal oil ether was at one time largely used for these cases, but was abandoned, not only because of the uncertainty of its effects and the tedious preparation required, but because the same difficulties of airway were encountered and had to be overcome, as when the patient was anæsthetized via the respiratory passages.

Of the methods of administration intratracheal insufflation is by far the most valuable, and is used in fully nine out of every ten cases. Its freedom of airway reduces the chances of anæsthetic shock to a minimum, and the lack of respiratory effort is no doubt a material factor in supporting the patient's strength. Its easy control, without in any way disturbing the surgeon, is also a great advantage in these essentially aseptic operations.

For selected cases local anæsthesia combined with gas analgesia is useful, and quite extensive operations are often performed with it. Amongst others we have records of three bone-grafts of the mandible in which this form of anæsthesia was used.

On the whole tissue trauma is small. Although most of the operative manipulation is confined to skin, there is no tearing or pulling, so that few harmful stimuli should reach the brain; moreover, except when taking cartilage from the ribs, the surgeon never requires relaxation. Prolonged deep anæsthesia in itself seems to produce a condition of collapse, so that taking into consideration the protracted nature of most of the operations, we believe that the less anæsthetic given the better is the patient's general condition both during and after operation. We, therefore, after the first incision, keep our patients as lightly under the anæsthetic as is consistent with a smooth and tranquil anæsthesia.

DISCUSSION.

Mr. ERIC GANDY asked whether the authors could give in detail their reasons for abandoning colonic oil ether anæsthesia in these operations on the face where a good airway existed.

Mr. BOYLE said that to produce good anæsthesia for plastic operations on the face at times taxed all the ingenuity of the anæsthetist, for in this type of operation were to be found some of the most difficult cases. He was particularly interested in the description of the passing of the tube through the nose and thence into the larynx; and thought that of the two instruments shown for the purpose of introducing the catheter the forceps was preferable. He was interested, too, in the "dilatation of the nose," so that a large tube could be passed on either side, but did not this tube cause bleeding? His own experience of passing nasal tubes was that although one side of the nose was usually free, it frequently happened that it was almost impossible to pass a second tube through the other nostril. He was not surprised to hear that the oil ether anæsthesia had been discontinued for these cases of plastic operations. During the war he had had a considerable experience of oil ether *per rectum* in this type of work, but had come to the conclusion that it was too uncertain in its action, and frequently had to be supplemented by some other anæsthetic; at first he had used open ether or chloroform, but in the later days of the war he used gas and oxygen. There was also another objection to the oil ether, viz., the long period of unconsciousness after the operation before the drug was eliminated. At the moment he was using for this type of case a combination of gas-oxygen and C.E., and had some excellent results with it. The experience of the writers of this paper coincided with his own, namely, that patients after a prolonged operation under gas-oxygen-ether were far better than when

ether alone was given. He had been giving gas and oxygen by the endotracheal method and the results were exceedingly good; he described the case of a man who had glycosuria and to whom he had given gas oxygen endotracheally for over two hours for a rhinoplasty. All sorts of gadgets were necessary in anæsthesia for plastic surgery of the face, and in the contrivance of these the writers of the paper has shown great ingenuity.

Mr. KIRKBY THOMAS said he had given a considerable number of anæsthetics to patients suffering from jaw injuries in the special department for these cases at the First Southern General Hospital. His method, after preliminary narcotization with morphia and atropine, was to induce anæsthesia by means of the C.E. mixture on an open mask. A wide rubber tube was then passed well down into the pharynx and packed round with gauze. Free respiration having been established through this tube, the delivery catheter of a Junker's inhaler was passed into the tube and retained in position there by pressure against a safety-pin transfixing the pharyngeal tube. The administration was then continued with a mixture C_4E_1 by means of the Junker. This mode of anæsthetization was found to be particularly successful. The surgeon was eminently satisfied and the after-effects were slight. Mr. Kirkby Thomas emphasized the fact that the degree of anæsthesia required in these cases was very light, and that the excellent results obtained by the method were probably due to that.

Dr. MCCARDIE said that throughout the war period he had given the anæsthetics in the department at the First Southern General Hospital, which dealt with exactly the class of cases treated at Sidcup. Rarely had he used any but the most simple of methods for maintaining anæsthesia; viz., that by nasal or oral intubation and "draw over" inhalation from a mask or plain gauze. He had found this method altogether satisfactory, and so had the surgeon and dental surgeons concerned. In nasal intubation it was important that the tubes should have as large a lumen as possible and be comparatively stiff. Shortened œsophageal or Crile's tubes with lateral and end openings were used, the nasal end opening being as large as the distal. Occasionally one tube was placed in the mouth and the other, or others, in the nose. In oral intubation the anæsthetic was sometimes pumped into the tube after the mouth had been well packed with gauze, but generally the "draw over" method was adopted. Morphia, $\frac{1}{6}$ gr., with atropini, $\frac{1}{100}$ gr., was invariably injected half an hour before operation. For induction of anæsthesia a few drops of E_2C_1 dropped into the bag and followed by $E_{16}C_1$ from Clover's inhaler were, if possible, used; anæsthesia was then continued with chloroform. There were advantages in administering chloroform. There was very little oozing of blood, while respiration and circulation were quiet. Vigorous breathing from etherization, especially through nasal tubes, resulted in a relative obstruction and strain on respiration, followed by secondary strain on the heart in a long operation. But the quiet respiration under chloroform could be efficiently carried on without strain through the tubes or through even one tube and very light anæsthesia easily maintained. He had never seen any ill after-effects due to chloroformization in these cases. With regard to rectal oil-ether anæsthesia it was found that the men objected to it, and, like the intratracheal method, it was unnecessarily involved and time-using in very busy operating theatres as a routine procedure.

Dr. F. E. SHIPWAY said that there could be no doubt that intratracheal ether was much superior to the older methods of anæsthesia for operations on the face. He quite agreed with Mr. Boyle that passing tubes through the nares was not without serious disadvantages; it frequently caused damage to the mucous membrane and free bleeding. He had always been opposed to the passing of the intratracheal catheter nasally, for he felt that there was a risk of carrying septic material from the nose or pharynx into the trachea and blowing it into the bronchi. He noticed that Mr. Rowbotham and Mr. Magill had reported two cases of pneumonia in their series. Did either of those cases occur in patients who had been given intratracheal ether through a nasal catheter? He was glad Mr. Rowbotham and Mr. Magill had condemned the use of his warm ether apparatus as a draw-over inhaler. It was never intended to be used in that way, as the lumen of the tubes was much too small and the dead-space was considerable.

Mr. CHARLES T. W. HIRSCH said that the question of nitrous oxide oxygen anæsthesia was one that much appealed to him, though he thought that in a certain number of these cases the assistance of other agents was at times needed. The one in common use was ether, as stated by the authors. Bubbling gas oxygen through chloroform, which produced a light chloroform anæsthesia, was, as Levy pointed out, a source of danger. The objection to bubbling through ether was that it was easy to use more than they wanted to secure results; in addition, the occasional large dose of ether was against the golden rule of uniformity of anæsthesia dosage and anæsthesia. To obviate this, he had fitted a T-piece with three taps to the ether bottle; when the centre tap was open and the two side taps closed gas oxygen passed pure; when the first tap was closed and the others open it bubbled through the ether; but with the central one open and the others also open, the gas in passing drew up a small amount (about 2 per cent. to 3 per cent.) of ether, which ensured the needed uniformity of dose and obviated the excessive occasional larger percentage. By this means, after induction with gas oxygen, the required depth for these cases could be obtained and maintained without justifying the term "a camouflage for ether." He showed the fitting in question at a meeting of the Section in 1918, and an account of it was published in the *Lancet* of July 13, 1918.

Mr. ROWBOTHAM (in reply) said that in passing the catheter through the nose, it did sometimes happen that it could be pushed straight on into the trachea, without any other manipulation being required, but in these cases experience had shown the need for some other more certain means of guiding it. In neither of the two cases of pneumonia reported was a tube passed by the nose. He had never been troubled with much bleeding when passing tubes through the nose. Shaping the tube at its end to a point, smearing it with vaseline, and gradual and gentle dilatation, starting with a very small tube, seemed to be the main points.

Mr. MAGILL (in reply) thought that long operations and repeated anæsthetization were in themselves sufficient factors to warrant the choice of an agent less toxic than chloroform. He was of the opinion that even though hæmorrhage might be greater with ether, it was better that hæmostasis should be carried out at the time of operation than that the surgeon should be called to deal with a reactionary hæmorrhage not apparent at the time of operation, owing to the depressant effect of chloroform on the circulation.